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Measures for the combating of Typhoid fever.

The sum of 150000 mark having been granted in the Imperial Budget of 1903 in aid of measures to be taken against Typhoid fever it is considered desirable in order to obtain the greatest possible uniformity in the more rigorous measures to be enforced conjointly against Typhoid fever in the Western Provinces of Prussia, Bavaria, Oldenburg and Alsace-Lorraine, to determine the main aspects of the question more exactly.

For this purpose the following drafts were elaborated by the Imperial Board of Health:

1. Instructions concerning the combating of Typhoid fever for the proposed investigating Stations.

2. General Principles in combating Typhoid fever, so-called („abdominal Typhus") for administrative authorities. These drafts, after having been discussed in the Imperial Sanitary Council, were formulated as below and forwarded to the participating Federal Governments by the Imperial Chancellor, in order to be made use of in a suitable manner when issuing the regulations for the individual States.

In elaborating the drafts, care has been taken to emphasise those measures considered necessary Appendix A and B.

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from a sanitary point of view, by an authoritative style of wording, but to leave it to the discretion of the individual Governments, as to how far it is possible, to carry out these measures by the strength of the lawful authority appertaining to the administration, or in individual cases, by arriving at an understanding with those persons affected by the measures.

Appendix A.

Outline of Instructions for Investigating Stations to be established for the combating of Typhoid fever.

1. Every Investigating Station etablished for the combating of Typhoid fever must examine all suspicious Typhoid mattern, forwarded by the authorities or doctors belonging to the district, in conformity with the „Instructions for the bacteriological determination of Typhoid fever" (Appendix 1).

2. The result of the investigation must in all cases be immediately communicated to the person forwarding the material to be examined. If Typhoid has been established through the investigation, the competent police authorities of the domicile, place of sojourn, or death place of the person taken ill, must be notified.

3. The Typhoid registration forms received (see Appendix 2. Instructions, No. 5) must be numbered consecutively at every Investigating Station, and be arranged accordingly; the books and lists mentioned in Appendix 2, must also be kept.

4. The Director of an Investigating Station is authorised to undertake investigations (under certain circumstances on the spot) in a locality, if the registration forms received make him think it desirable

to determine the origin and extent of the illness, or to have such investigations carried on by the doctor of the Investigating Station. He must, however give timely notice of the investigations to be made on the spot, to the competent higher Board of Management, the local official doctor, and the local police authorities.

5. If the Director of an Investigating Station considers it necessary that „matter" from sick or apparently healthy persons should be sent in from a locality for investigation, he must notify the official doctor of the fact and consult with him about the steps to be taken.

6. In making enquiries it is especially necessary to settle the following:

a) whether the cases were imported,
b) whether water was the cause of infection,
c) whether the infection was caused through food (dairy products, salads, etc.),
d) whether the malady was transmitted through a person infected with Typhoid (family epidemics, house epidemics),
e) whether local centres of disease come into question (endemical Typhoid, Typhoid houses).

For this purpose the researches or investigations made have to be extended to

α) people belonging to the family, relations, living in the same settlement, persons living under the same roof, neighbours of the person ill, and visitors from abroad;
β) the sources of food (consignments from abroad) and drinking water;
γ) the dwelling and the place of work of the sick person, previous to and after the period of incubation;

δ) previous, although apparently different kinds of illnesses of family relations, persons under the same roof, or in the locality.

In connection with the above, the police register of arrivals, the list of absentees from school, the local sick fund lists, the registry of deaths must be examined; enquiries must be made about the state of health of the members of workmen's societies and miners associations, of children's crèches, further as to the number of sick persons in the hospitals. Doctors, and other suitable persons (clergymen, teachers, midwives, etc.) must be interrogated about the matter. The local grouping of Typhoid is best ascertained by marking the cases on a map of the locality.

7. The Directors of Investigation Stations must lose no time in acquainting the proper supreme administration of the result of investigations made (No. 4), and must make proposals for the measures, considered necessary.

8. Directors of Investigation Stations are bound to give advice on questions regarding the combating of Typhoid when requested to do so by the higher administration of their district. Any inquiry rendered necessary for this purpose must be carried out in agreement with the proper supreme authorities.

Under certain circumstances it may be necessary to establish a branch laboratory for a longer or shorter period in a place. The Director of the Investigating Station, in whose district the branch laboratory is to be established, must communicate for this purpose with the Imperial Board of Health and the higher proper administration officials, and then assign to the branch laboratory its tasks and superintend its working. The branch laboratory stands

under the direction of the investigating station, to whose district it belongs.

10. The investigating officials have to determine by repeated enquiries at suitable intervals, whether the excrements and secretions of persons sick with Typhoid, or persons infected by Typhoid bacilli in their districts, still harbour infectious germs of Typhoid.

The directors of Investigating Stations must consult with the competent official doctor about the forwarding of investigation material required for the above purpose.

The results of the investigations must be immediately communicated to the official doctor.

11. Directors of Investigating Stations must always keep in touch with each other, and should exchange reports about important occurrences. If a case of Typhoid has been imported from the district of one Investigating Station into that of another, the Director of the first station must notify the same (giving short details of the circumstances accompanying it) to the Director of the second station, immediately on being acquainted with the fact.

12. Directors of Investigating Stations have to report to the authorities deputed by the State Government on all important occurrences in their district, especially about the discovery of fresh centres of Typhoid, and about the success attained in suppressing the malady in places attacked by it.

In addition, reports must be sent in every three months to the same authorities about the activity of the Investigating Station and its branch laboratories, as well as about experiences gathered and observations made during that period.

Appendix 1 of the Instructions.

Guide for establishing by Bacteriology the presence of Typhoid fever.

I. Material suitable for investigation.

1. Fæcal Matter (from 50 to 100 cubic centimetres; in the case of solid matter an amount about the size of a walnut).

2. Urine (as much as can be obtained up to $^1/_2$ a litre).

3. Blood from roseola spots (obtained by superficial scarification of the spots).

4. Expectoration.

5. Ulcerated secretions or inflammatory exudations of all kinds.

6. Blood a) by puncturing a vein in the arm and extracting from 2 to 3 cubic centimetres, b) by a prick in the lobe of the ear).

7. Dirty Linen (amongst other things swathing bandages) in case of severe diarrhoea;

8. Corpses. The contents of the intestines taken from just above the Ileocoecal valve, pieces of milt, mesentery glands, gall, contents of ulcers, pieces of the lungs, contents of bronchial branches.

9. Water from wells (after the bottom has been stirred up) about 3 to 5 litres.

II. Method of Investigation.

A. Culture.

1. Of I. 1, 4, 5, 7, 8. Preparation of at least 2 series of plates on Drigalski-Conradi's fostering soil (see Appendix), cultivation at a temperature of 37° from 18 to 24 hours.

2. Of I. 2. Investigation as II. 1. The sediment obtained by centrifugence to be used as seed.

3. Of I. 3 and I. 6a. To be sown in slightly alkaline bouillon peptone broth; in case of 3 in tubes containing about 10 cubic centimetres of broth, for 6a in large flasks with about 150 cubic cms of broth. Cultivation at a temperature of 37°; to be sown on plates like II. 1 after 20 hours time.

4. Of I. 9. The water to be examined must be poured into one or several cylinders of about 2 litres measuring capacity. For every 2 litres of water, 20 cubic cms of a 7·75 % sterilised solution of Natrium thiosulfuricum (Imperial German Drug Book) in water must be added, and well mixed. Then 20 cubic cms of a 10 % sterilised solution of nitrate of lead in water must be poured in. The precipitation resulting must be obtained either by centrifugence, or by letting the mixture stand for about 18 to 24 hours and by pouring away the liquid. Fourteen cubic cms of a 100 % solution of Natrium thiosulfuricum (Imperial German Drug Book) in water must be added to the sediment, well shaken, and the liquid poured into a sterilised tube until the insoluble constituents fall to the bottom. Cakes of 0·2 to 0·5 cubic cms. of the clear solution are then prepared as in II. 1.

The colonies growing on plates prepared as described must first of all be observed with the naked eye during daylight, as to their size, colour and transparency. Colonies suspected of Typhoid bacilli (small, diaphanous, and blue violet in colour) must be macroscopically examined on cover glasses as to their attitude to strong agglutinous Typhoid serum, and pure cultures of a number of them reared on congealed alkaline bouillon peptone agar.

For determing the nature of the pure cultures reared as described more exactly, the following tests may be applied:

a) Examination as far as shape and mobility are concerned.
b) Cultivation on neutral red agar.
c) „ in litmus whey.
d) „ on potatoes.
e) „ on gelatine plates.
f) The Agglutination Test (see B 1).
g) Pfeiffer's Test (see C).

Of every Typhoid culture ascertained, a pure culture, at least 20 hours old, must be placed on slantingly congealed alkaline bouillon peptone agar, and made airtight by melting the tube; the culture must be kept in the dark at the ordinary temperature of a room, for the purpose of a reinvestigation.

B. Agglutination Test.

1. To determine a suspicious „colony", or a pure culture.

a) In hanging drops (a solution of 0·8 % of common salt) slightly magnified. A perceptible formation of little clusters must take place if specific serum in double concentrations is used, either immediately, or at the latest after having been put into the incubator at a temperature of 37°.

b) Quantitative determination of the Agglutinative capacity. Dilutions of the test serum with a 0·8 % solution of common salt (filtered twice through a hard filter in order to obtain clearness) must be prepared in the following proportions. 1 : 50, 1 : 100, 1 : 500, 1 : 1000 and 1 : 2000. 1 cubic cm. of each of these dilutions must then

be placed in test tubes, and a pins head of the agar culture to be tested (not older than twenty four hours), rubbed into each one, and uniformly distributed by a good shaking. After having been kept in the incubator at a temperature of 37° for a period not exceeding 3 hours, the tubes must be taken out and inspected; this is best done by holding them slantingly and examining them with a weak magnitying glass from underneath so, that the light is reflected from the ceiling. The result of the investigation can only be looked on as positive in the event of the undoubted formation of little clusters (Agglutination) having taken place.

Every investigation must be accompanied by controlling experiments, such as:

1. with the same culture, and with the diluted liquid;

2. with a known Typhoid culture of the same age as the culture to be examined, and with the test serum.

2. The examination of the serum of a suspected person.

a) The extraction of blood: this is best carried out by a prick in the lobe of the ear with a puncturer, if necessary with a new steel nib, half of the point being broken off, or with a pin.

The lancet of the puncturer must be screwed out so far, that in pressing the button it projects for at least 3 mms. (in the case of anaemic persons a little more) out of its casing.

The blood squeezed out in drops must be sucked up in capillaries about 6 to 8 cms. in length and 2 mms. inside width, the melted pointed ends of which have been previously broken off.

The blood ought to enter the capillary, which must be held slanting and downwards, without delay. If this does not happen, coagulation has already taken place, and a fresh tube must immediately be used.

The capillaries must at least be half filled.

The capillaries are made of thin barometer tubes 2 mms. or a little more in width, over a Bunsen burner, or a high burning spirit flame. The glass tubes can be obtained from every optician, and samples of the capillaries from the Investigation Stations at Treves, Saarbruecken or Metz.

The capillaries filled with blood must be closed by sealing wax, or wax, but never by being melted over a flame.

b) The extraction and employment of serum. After a few hours, or only an hour, if in a refrigerator the serum separates itself as a clear liquid.

If the ends of the capillaries are broken off so far up that the serum flowing out has not to pass any narrow place of the tube, a clear serum with hardly any admixture of blood is obtained. In other case suitable centrifugence can be resorted to.

The serum, must then be measured by a 1 ccm. pipette divided into 1/100 degress, and diluted to fifty times its bulk by a sterilised 0·8 % solution of common salt. Should the dilution not amount to 2 cms., the test for Agglunitation must be made on a coverglass, in other cases in test tubes containing from $^1/_2$ to 1 cubic cms.

Microscopic Agglutination Test: In each of two drops of the dilution of 1 : 50 placed on coverglasses, as well as in a third drop of a dilution of 1 : 100, a needle-point's amount of a Typhoid culture (the cultures not being older than 48 hours) must be ground round until that a discolouration can be seen

by the naked eye. The Platinum needle-point must then be burnt off, and the drop rubbed round again uniformly.

The cover-glass must be rendered airtight by a border of vaseline round the hollowed out object holder.

Macroscopic Agglutination Test: The rest of the Serum must be diluted to 1 : 100 by adding an equal amount of an 0·8 % common solution and tested with both cultures in test glasses as to its agglutinatinous capacities. To every cubic centimetre of diluted serum 1 standard loop (2 mg.) of the culture must be carefully rubbed on the inside of the tube.

The tests should be left to stand either for 3 hours at a temperature of 37°, or from the evening until the next morning at the ordinary temperature of a room.

c) Testing of the reaction: The agglutination, also in cases of macroscopic tests (in test tube), must always be microscopially observed, especially if blood corpuscles are mixed with the serum.

The test 1 : 50 on the coverglass only serves as a guide.

Should there be abundant clusters, if only of six to seven bacilli in a preparation, containing originally only single bacilli, the reaction can be regarded as positive.

Should the test 1 : 50 prove positive but not the test 1 : 100, it well be necessary to secure further samples of blood after a few days and to regard the case during that time as suspicious.

If only the test made with Typhoid bacilli (B. paratyphi) is positive, a case of „Typhoid" (Paratyphus) may be suspected, but has not been proved.

C. Pfeiffer's Test.

The serum used for this must be as concentrated as possible.

In order to carry out the above test 4 guinea pigs; each about 200 gr in weight are required.

Animal A should be given the fivefold multiplum of the titerdosis of the serum.

Animal B should be given the tenfold multiplum of the titerdosis of the serum.

Animal C serves for controlling purposes and should be given the fiftyfold multiplum of the titerdosis of ordinary serum from the same kind of animal serum used for A and B.

The serum doses, each one being mixed with the culture under investigation must be injected into the abdominal cavities of each animal. The culture should have been reared on agar in 1 ccm. of bouillon (not common salt or peptone solutions) at a temperature of 37° for 18 hours.

Animal D only receives $^1/_4$ of a loop of culture intraperitoneal, in order to ascertain, whether the culture is virulent as far as guinea pigs are concerned.

For injecting, a canule with blunted point should be used, and the injection in the abdominal cavity must be made, after the outer skin has been cut through; the canule can then easily be pushed into the abdomen. The peritonealexsudat taken out in drops for microscopical examination should also be obtained by means of glass capillaries at the same place. The examination of the exsudat should take place in hanging drops strongly magnified, and twenty minutes, 1 hour, and 2 hours after the injection.

In the case of animals A and B a typical formation of little granules, or the dissolution of the bacilli must

have taken place, whilst in the case of animals C and D a large number of actively mobile bacilli should be present. If this is the case the diagnosis made is confirmed.

III. Opinion, based upon the „finding".

A preliminary diagnosis of Typhoid may be established, if cultivations on von Drigalski-Conradi's fostering Agar (see Appendix) show characteristic features, and in the event of a positive result of the Agglutination test in hanging drops (II B 1a).

Such cases must be reported immediately without prejudice as Typhoid cases. In order to finally conclude it is Typhoid fever the positive result of all the tests made according to II A and B is sufficient. If any doubt exists, after such tests have been made as to the kind of bacilli cultivated, the Pfeiffer Test (II C) must then be applied.

Appendix.

Preparation of fostering soil for demonstrating the existence of Typhus bacilli, according to von Drigalski and Conradi.

Computed for 2 Litres.

I. Preparation of Agar.

3 pounds of horseflesh without any fat must be chopped finel, 2 litres of water poured over it, and allowed to stand until the next day (in a refrigerator).

The water from the meat must then be pressed out, if possible with a meat presser, and after having had

1 % = 20 gr. of Peptone,
1 % = 20 gr. of Nutrose and
0,5 % = 10 gr. of common salt added,

must be boiled for 1 hour.

This bouillon must then be filtered through muslin and boiled for three hours in a steam kettle with 3 % = 60 gr. of broken up stick agar, and then filtered again through sand (Rohrbeck's sand filter), or muslin[1] into the steam pot.

II. Sugar of Milk-Litmus Solution.

300 cubic centimetres of Kahlbaum's (Berlin) litmus solution must be boiled for 10 minutes, and 30 gr. (1,5 %) of lactose added; the whole must then be boiled again for 15 minutes.

III. Mixing.

The hot Lactose-Litmus solution (II) must be poured into the hot mass of Agar (I), and the mixture, which is red in colour alkalised with a 10 % solution of soda until a weak alkalic reaction takes place.

Alkalising is best done during the daytime and with the litmus contained in the fostering soil serving as an indicator. The colour test is easily made in the neck of the flask, if held slantingly against a white background. At night-time alkalising must be done by aid of Phenolphtalaine paper.

6 cubic centimetres of a sterilised warm 10 % soda solution of 0,1 g. crystal violet 0 chemically pure in 100 Aq. dest. steril. (in no case more) must then be added to the weak alkalised fostering soil.

The fostering soil is drawn off in amounts of about 200 cubic centimetres into flasks (Erlenmayer's), and can be kept in them for weeks.

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[1] In filtering through muslin the filter funnel must be covered with a light overlapping cover, to prevent dilution through condensed water flowing in.

The double saucers for the preparation of cakes must have a diameter of 18 to 20 cm. Slabs must not be kept, but always made anew.

The skimming of the surface is best performed by means of von Drigalski's glass scoop, after fæcal matter has been diluted with a sterilised 0·8 % common salt solution and rubbed round.

An ordinary Petri saucer should be used for the first (original) slab, and large double saucers for the 2nd and 3rd.

It is advisable to prepare 2 series of cakes of every sample of fæcal matter.

Appendix 2 of the Instructions.

Index of the Lists and books to be kept in Investigation Stations.

1. Report Book as pattern a.
2. Journal as pattern b.
3. Ledger of all investigations made, arranged alphabetically with index.
4. Account book.
5. Travelling Diary, containing short descriptions of enquiries, made at places as pattern c.
6. Survey lists, weekly, of the cases reported and discovered in the district; pattern d.
7. Correspondence about Typhus investigations.
8. Papers referring to official correspondence.
9. Stock Book.

Pattern a.

Consecutive Number. (Corresponding to registration form).	Surname and Christian name	Age	Domicile or place where taken ill	District	Day of notification	Day of illness	Remarks. (Especially if connected with other cases already reported, and of what nature the connection is)

Pattern b.

Consecutive number	No. of registration form	Name, Dwelling of the correspondent	Day of receipt	Day of answer	Name of person investigated	Place where material is taken from	Nature of material	Result (See Notes)	Name of Investigator	Remarks.

NOTE: In the case of a positive result in blood, the action of the Typhoid and Paratyphoid bacilli must be given under T and B, as also the degree of agglutination; for instance:

T. 1 : 500 +, P. 1 : 100 +.

positive find of bacilli must be underlined red, a positive result of blue.

PLACE **Pattern c.**

A = adult. C = child.

Consecutive Number	Name	Calling	Age	Dwelling	Day of Illness	Day of Notification	Duration of illness	Result of illness	Number of people living with patient A. C.	Medical treatment	Clinically safe	Bacteriologically established	Remarks (relation to other cases, clinical symptoms.

Sum-

Illness and Deaths occurring in ..... in the governmental

The cases of death

(Continued in next column)

Residence Municipality	Parish	Number of cases of illnes and death												weeks in
		1		2		3		4		5		6		7
		J	D	J	D	J	D	J	D	J	D	J	D	J

Pattern d.

-mary

district of ..... arranged according to municipalities and places.

are to be marked by crosses.

(Continuation from last column)

from ..... to ..... the year	Total of weeks 1—53	Altogether

Outline of the general principles to be observed by the Government authorities in combating Typhoid (Typhoid fever).

Regulations for combating Typhoid (Typhoid fever).

1. Notification.

1. Provision must be made, that every case of illness or death from Typhoid (Abdominal Typhoid), as well as every illness or death from suspected Typhoid, be immediately reported either verbally or in writing to the local police authorities of the dwelling or death place of the person taken ill. Should the sick person change his or her domicile, it is advisable to notify the proper police authorities of the late dwelling place and of the new place of sojourn. The police authorities must draw attention from time to time to the duty of notifying such cases by public announcements.

2. It is advisable to supply practising doctors with the accompanying „Advice for doctors in cases
Appendix 1. of Typhoid and Dysentery“ (Appendix 1), as also
Appendix 2. to bring the „Notes on Typhoid“ (Appendix 2), elaborated by the Imperial Board of Health, in a suitable way to the notice of the population of those places and districts infested by the illness.

3. In order to render notification easier, it is advisable to promote the use of unstamped postcards marked in front „Official matter subject to postage“. The police authorities should therefore obtain a sufficient quantity of such cards, stamp them with their official seal or stamp, and distribute them free of charge, especially to doctors, nurses, coroners, etc. The postcards should be printed on the back as in
x 3. Appendix 3.

4. The police authorities must keep lists, as accompanying pattern (Appendix 4), of the cases of Typhoid established; such lists must be based on the notifications received and be consecutively numbered. Appendix 4.

II. Ascertainment of the Malady.

5. The police authorities must immediately notify every case of illness, or death from Typhoid, or suspected Typhoid case, which comes to their knowledge, to the competent superior administrative authorities (see form in Appendix 3), and also make similar communications to the official doctor, as well as to the Investigating Station, established for the combating of Typhoid.

6. It is advisable, especially in the first case of illness in a locality, that the official doctor should make investigations on the spot as to the kind, the stage and origin of the illness, immediately after the receipt of a notification; this is best done in cooperation with the doctor treating the case. Enquiries should also be made, whether other suspicious cases in the neighbourhood of the sick person, or in the locality are in existence. Hereby attention must not only be paid to cases of intestinae disturbances, but also to illnesses of long duration, and of a feverish or indefinite nature, as well a to such symptoms of illness, which, according to experience, often follow in the wake of Typhoid. (Loss of hair, Affectations of the central nervous system, ulcerations, etc.),

Under certain circumstances, clergymen, teachers, parish officials and other suitable persons (postmen, policemen, disinfectors and midwives) must be asked, whether they are aware of any suspicious cases, or of any illnesses of long duration.

In making enquiries as to the origin of the illness, attention must be paid to the fact amongst other things that convalescent or apparently healthy persons, especially children, can harbour infections Typhoid matter and propagate it in their excretions.

7. The official doctor must be allowed admittance to the patient or corpse, provided it is necessary in order to determine the illness and provided that no injury is caused to the sick person thereby; every assistance is to rendered to the official doctor when making the necessary investigation about the nature of the malady.

Persons, whose duty it is to give notice of cases of illness or death (§ 1) are bound to give information on all important points about the origin and the course of the illness, when requested by the official doctor and the local police authorities.

8. In order to finally establish Typhoid bacteriologically, where any doubt exists as to the nature of the illness, the official doctor must immediately despatch suitable material from the sick person for investigation to the local Investigating Station, in conformity with the regulations given for the despatch of investigation matter suspected of Typhoid (Appendix 1 No. 7). It is desirable that such material should be despatched by the doctor treating the case before the arrival of the official doctor.

In order to facilitate as far as possible the despatch of material for investigation, it is advisable to supply doctors with suitable glass vessels ready for forwarding, free of charge.

9. The official doctor must state to the police authorities, whether an outbreak of the illness is established, or whether the suspicion only of an outbreak is concerned.

If, according to the opinion of the official doctor, Typhoid exists, the police authorities must immediately enforce the regulations for the prevention of a spread of the malady. It is advisable to act in all suspicious cases, as long as such suspicion has not been refuted, just as if real Typhoid cases were concerned.

10. In special cases, where according to the opinion of the Director of the Investigation Station established for the combating of Typhus, it is necessary to have enquiries made by an expert on the spot, such enquiries should take place; the above mentioned Director however must inform the superior administrative authorities of the district, the local official doctor and the local police authorities in due time, of the investigations to be made.

The police authorities must provide, that these experts receive every assistance in making the necessary examinations in the case of public arrangements, or of dwellings, institutes, works, etc. If requested the experts should be accompanied by a police official when making such inspections.

It is advisable, that the official doctor should take part in such inspections, wherever his district is concerned.

III. Measures against the Spread of the Malady.

11. It is advisable, immediately to isolate persons suffering from Typhoid, as well as persons suspected of being attacked by Typhoid fever.

Such persons are considered suspicious (until two bacteriological investigations, made at weekly intervals have removed any suspicion of an epidemic) who have sickened under symptoms, which give rise to the

suspicion of Typhoid fever. Apparently healthy persons, in whose excretions Typhoid germs have been found at the bacteriological investigation, are to be treated as sick persons.

12. Isolation has to be carried out so that the spread of the malady is practically avoided.

Should it not be possible to carry out the isolation of the patient in a proper manner in the dwelling house of the sick person, the removal of the same to a suitable hospital must be urgently advocated. This is especially necessary, if the sick person lives in an inn, an educational or training institute, prison or similar establishment, a school building, a milk, vegetable or other provision shop, or if the relations of the sick person are particularly endangered (for instance, in case of a very unclean or overcrowded dwelling, poverty of nourishment, the presence of many children).

The isolation of a person suffering from Typhoid fever, must last, until two consecutive bacteriological weekly investigations of the excrements have proved them to be free from all Typhoid germs.

13. It is advisable to subject persons suspected of being able to infect (viz. such persons who do not actually evince symptoms of illness, but who warrant the fear that they have received contagious Typhoid matter into their system) to observation, which should not last longer than 3 weeks, reckoned from the last day, where an opportunity of their being infected occurred. The observation, which should be carried out in a considerate manner so that all vexation be avoided as far as possible, can, as a rule, be limited to a doctor or other suitable person making enquiries from time to time about the state of health of the person concerned.

The extent to which persons suspected of being infected are to be subjected to bacteriological investigations, depends on the opinion of the official doctor and the Director of the Investigating Station.

Should a person under observation change his domicile, it is advisable to inform the police authorities of the locality moved to, and of the condition of things, so that he may still remain under observation.

14. It is advisable that the official doctor should prepare the following list, which must be submitted to the police authorities so that protective measures can be more reliably carried out.

1. Persons suffering from Typhoid fever.
2. Persons suspected of being affected.
3. Persons suspected of being likely to infect.

A copy of the list must be forwarded by the police authorities to the competent Investigating Station.

15. It may be found necessary, if the official doctor declares it imperative for the more effectual combating of the complaint, that healthy people should evacuate their dwellings, so that the sick persons can be left there instead of having to be accomodated in hospitals, or other suitable places for isolation.

It may be advisable, under the same supposition and in exceptional cases, to have the whole house evacuated, if particularly unfavourable conditions prevail, such as may promote the spread of the disease (overcrowding, uncleanliness, etc.). The residents must then be afforded suitable accomodation elsewhere, free of charge.

It is advisable to make dwellings or houses, in which there are persons suffering from Typhoid fever conspicuous by certain signs.

16. Public means of conveyance (cabs, tramways, etc.) should, as a rule, not be used for the transport of sick persons or persons suspected of being sick.

Provision must be made, that vehicles and other means of transport, which have been used for the conveyance of sick or suspected persons, are immediately and properly disinfected before being used again.

17. Persons who devote themselves to nursing and attending on Typhoid patients, must be submitted by the official doctor to the measures considered necessary to prevent the illness spreading.

18. The corpses of persons who have died from Typhoid fever must, when possible at once be wrapped in cloths saturated in disinfecting fluids, without being washed or having their clothes changed first. They must then be laid in airtight coffins, the bottoms of which have been strewn with a thick layer of sawdust, peat refuse or other absorbent materials.

The corpse may not be washed (in exceptional cases), unless the precautionary measures, ordered by the official doctor have been conformed with, and only with disinfecting liquids.

In the event of a mortuary being close at hand, the be screwed down and coffin containing the corpse must be transported thither as soon as possible. In localities where there is no mortuary, provision must be made, that the screwed down coffin is placed, as far as is feasible, in a special, lock up place until the burial. The corpse must not be shown in the mortuary, or in an open coffin.

The burial of Typhoid corpses must be hastened as far as possible. Persons who are present, when the body is placed in the coffin, must make it their duty to conform with the measures considered neces-

sary by the official doctor to prevent a spread of the illness.

19. The police authorities have to enjoin on the master or mistress of the house, as well as the nursing staff, the necessity of constantly disinfecting the excretions of the patient (fæcal matter, urine, expectoration, purulent secretions) as well as all articles, that have come into contact with sick persons (bed and body linen, clothes, eating and drinking utensils, washing and bath water, etc.) during the progress of the illness.

Provision must be made, that healthy people disinfect their hands or other parts of the body, that come iuto contact with the sick person, or infected articles (excretions of the patient, dirty linen, etc.).

In addition to this constant disinfection, a final disinfection must be carried out, after the sick person has been sent to a hospital, his recovery, or his death. The same has to extend to the excretions of the patient, as well as all articles with which the sick person has come into contact. Special attention must be paid to the disinfection of infected rooms, to beds and the body linen of the sick person or who has died, as well as to the clothes, used in attending on and in nursing the patient. After recovery the sick person must also be subjected to disinfection. Dwellings which have been evacuated because of an outbreak of Typhoid fever, may only be used again after an effective disinfection has taken place.

20. Disinfection must be carried out according to instructions, contained in Appendix 5. Appendix 5.

If disinfection is impossible, or too costly in comparison to te value of the articles, they can be destroyed.

All persons, who by reason of their employment come into contact with persons ill with Typhoid fever or with articles which the latter have used, such as nurses, disinfectors, washerwomen, women who lay out the dead, etc. must be directed to conform with the disinfection regulations.

21. The competent authorities must consult together, as to whether gatherings, which cause a large number of people to meet together (fairs, markets, etc.) should be prohibited in such localities where Typhoid has broken out.

22. Juvenile persons belonging to a dwelling where Typhoid fever has broken out, must be kept from school, as long as, in the opinion of the local doctor, a spread of the illness from such a dwelling is to be feared. It is further advisable to prevent their associating with other children, as far as possible, more especially in public places and streets.

If a violent outbreak of Typhoid fever occurs in a locality, it may be found necessary to close the schools. Should a case of Typhoid occur in a school building, the school must be closed as long as the sick person is present in the building. Persons who are exposed to infection by Typhoid, must be excluded from giving instruction, as long as any danger of their infecting others exists.

It may be advisable to prevent children, in whose locality Typhoid prevails, from attending schools in other localities, where no Typhoid has broken out. Similar measures must be adopted for other educational establishments, attended by a number of persons.

23. The police authorities of the places, where Typhoid has broken out, must make provision, that articles, which in the opinion of the local doctor are

infected with contagious Typhoid matter, do not circulate among the public, before having been effectively disinfected.

Industrial concerns, by which a spread of infections matter may be feared, especially such as are concerned with the manufacture and sale of food and delicacies, and which are carried on in a house in which there is a person ill with Typhoid can be subjected to limitations, or closed, if in the opinion of the official doctor a continuation of business can be regarded as dangerous.

24. It may be advisable to restrict or limit the export of milk or dairy produce in such localities or districts, in which numerous outbreaks of Typhoid occur.

25. It may be found necessary to prohibit or limit the use of wells, ponds, lakes, brooks, water works, as well as of baths, swimming and washing establishments and public lavatories in such localities, either threatened or attacked by Typhoid. The renewed use of such wells can be made dependent on a previous disinfection being carried out. These arrangements can however, only be made in agreement with the official doctor.

IV. General Measures.

26. Increased attention must be paid to dwellings and to keeping them clean in places where Typhoid fever has broken out; this especially applies to overcrowded, badly lighted and ventilated domiciles and underground dwellings, lodging houses, shelters for the homeless, charitable institutions, inns, public houses, and similar establishments must be subjected to exact and regular inspection. If important evils are discovered, when an inspection is made, their removal must be urged.

27. Apparatuses serving for the general supply of water for drinking or domestic purposes, and for the removal of refuse, must be constantly inspected by government officials. Provision must be made in due time for the supply of pure water for drinking and general use.

Every pollution of the sources, or neighbourhood of water for drinking or domestic purposes, especially by domestic refuse, must be prohibited. The rinsing of dirty vessels and washing at the sources, or in their neighbourhood must be prohibited, in the event of a pollution of the water supply being feared.

28. Care must be taken, that dirty water is suitably and quickly cleared away from the proximity of houses.

Urinals and water closets, especially if accessible to the general public, must always be kept clean. Regular disinfection, as a rule, is only necessary in the case of such establishments of this kind (railway stations, inns, etc.), that are rendered peculiarly dangerous by their position, or by the class of their frequenters.

Cesspools may be emptied as long as an epidemic has not broken out in a locality; if, however, such a removal cannot be prevented during the course of an epidemic, it must be done with great care, and the careless dragging of the contents of the pit avoided.

29. Parishes are bound to provide for the abolition of all nuisances found, that are dangerous to health according to No. 27 and 28. They can at all times be compelled to make arrangements, as far as their resources permit, as described in No. 25, if such are necessary for protection against the transmission of Typhoid fever.

The Common law of the country decides in what manner the regulations that follow are to be set in force in various parishes.

30. In those localities, threatened or attacked by Typhoid fever the sanitary police inspection of the trades in food and delicacies must be especially and carefully exercised.

31. The erection of public disinfection establishments, in which steam can be used as a disinfectant, must be advocated.

The early training of a well schooled staff of disinfectors, especially in towns, must be undertaken.

The police authorities must make due provision, that the necessary accomodation, doctors, nursing staff, medicines, disinfectants and sick transport appliances are ready for use. A room for the accomodation of the dead must also be provided.

32. Precautionary measures and arrangements, undertaken against Typhoid can only be cancelled after consultation with the official doctor.

33. Those authorities or officials in garrisoned places and those localities situated for twenty kms round garrison places, or in military manoeuvring territory, who have been nominated by government, must report any cases of Typhoid, or any cases which cause suspicion of the complaint, directly after they have come to their knowledge, to the military authorities of the place concerned.

Every communication must be accompanied by details of the dwellings and buildings, in which the illness has broken out, or which are suspected.

The notifications concerning garrisons, or places situated 20 kilometres around them, must be adressed to the commandant, or if there is none, to the supe-

rior officer of the garrison, and notifications concerning military manoeuvring grounds to the War Office.

On the other hand the competent military authorities have to notify every case of Typhoid fever, or suspicion of the same, immediately on its being known, to the competent authorities of the place of residence of the sick person, such authorities having been designated by the government. Every communication must be accompanied by details of the military building or dwelling, in which the illness occurred, or suspicion is aroused.

34. Provision must be made that the administrative authorities of neighbouring districts of Federal States engaged in combating Typhoid should mutually advise each other once a week, about the places in districts, where Typhoid fever has broken out, also stating the number of cases.

The administrative authorities have to notify such communications immediately after their receipt to the competent Investigating Stations.

35. The provincial authorities have to send to the Imperial Board of Health the reports made by the Directors of Investigation Stations according to No. 12 of Instructions for Investigating Stations, with as little delay as possible.

Appendix 1.

Advice to Doctors in cases of Typhoid fever and Dysentery.

(Elaborated by the Imperial Board of Health[1]) 1).

1. Notification: An effective combating of Typhoid fever and Dysentery is only possible, if, in

[1]) With the kind assistance of the following members of the Imperial Council of Health: Professor Kirchner, Professor Robert Koch and Dr. Krieger.

addition to established cases of Typhoid or Dysentery, every sickness where Typhoid or Dysentery is suspected is immediately brought to the notice of the authorities.

If the patient is already dead on the arrival of a doctor, the authorities should also be immediately notified and provision should be made that the corpse and the articles used by the dead person are secured in such a way, as to prevent a further spread of the malady until the further directions of the competent authorities are made known.

2. Procedure in suspicious cases. Until the character of the malady has been established, the same measures must be adopted in suspected cases of Typhoid fever or Dysentery as in established cases of such illnesses.

3. Isolation of the patient. The sick person must be isolated and waited on by suitable nurses. If it is impossible to isolate him in his own house, the removal of the patient to a specially fitted up hospital must be insisted on. This applies chiefly to cases where the patient is a resident of an inn, of educational or charitable institution, of a prisons similar establishment, of a school building, milk, vegetable or provision shop, or if the relations of the patient are particularly endangered (for instance great uncleanliness, poverty of nourishment, the presence ofm any children, etc.).

As sick persons retain contagious germs in their bodies for a long time after their apparent recovery, and can evacuate them with their excretions, they ought to remain isolated until their excretions have been proved to contain no germs of illness for three consecutive days.

4. Instructions to those around the patient. The attention of the nursing staff and those coming into contact with the sick person must be drawn to the danger of contagion, and they must be instructed, by aid of the notes on Typhoid and Dysentery, how to avoid the same. They must have their attention especially drawn to the disinfection of their hands, and further to avoid eating in the room of the patient, dirtying their clothes or the floor with any excretions.

Special care must be taken in seeing that the excrements and bath water of the sick person are rendered innocuous by suitable disinfection.

5. Enquiries about further cases. If a doctor is treating a case of Typhoid fever or Dysentery in a place, it is very advisable, that he should endeavour to find out the cause and origin of the illness, and whether other suspicious cases exist in the neighbourhood of the patient, or elsewhere in the locality. It must be borne in mind when making the enquiries, that apparently healthy persons, espeeially children can harbour contagious matter of Typhoid or Dysentery in their intestines, and can evacuate them with their excretions.

6. Establishing the Diagnosis. In cases of suspected Typhoid fever if the perceptible symptoms do not suffice to determine the illness, it is advisable for the doctor to send samples of the excrements, and urine to the nearest station fitted up for investigations, at the same time giving details of the case. In many places there are public stations established, in which such investigations are made free of charge, and the doctor speedily informed of the result.

The excrements of those persons, who are healthy but who are suspected by the doctor of harbouring contagious matter must also be sent to the same

station. Doubtful cases of Typhoid fever and Dysentery can often be established even after recovery by the serum test. A little blood must be collected in lymph capillaries for this purpose by a puncture of the lobe of the ear, or of the finger, well packed and forwarded to the Investigation Station.

7. Despatch of material for investigation. It is expedient to forward samples of excrements in new powder or medicinal glasses, which should not be too thin. They must be well sterilised before using. After the investigation matter has been deposited in them, they must be closed by well greased glass stoppers or fresh boiled corks and covered over by moist parchment paper.

The vessels must not be rinsed out with disinfecting fluid, and no foreign fluid must be added to the investigation material. The consignment must be accompanied by a form, on which the following must be noted: The single contents of the consignment, the assumed illness, the name, age, sex of the patient, day and locality of the illness, home or place of origin of the person, if from abroad, day and hour of removal of investigation material. Each glass must in addition be labelled with its contents.

Only strong boxes should be used for packing, not cigar boxes, cardboard boxes, etc. The vessels containing the investigation material must be packed in shavings, hay, straw, wadding, etc., so that they are firmly fixed and do not touch each other.

The package must be tied with stout string, and labelled with the plainly written address of the Investigation Station and also marked "With Care".

The package must be handed in at the Post Office as "urgent".

All possible loss of time in obtaining, packing and forwarding the materials must be avoided, or else the successful result of the investigation is rendered more difficult.

NOTE.

The following disinfectants are recommended:

1. Diluted Cresolewater: In the manufacture of the same, cresole soap solution, (Liquor cresoli saponatus of the German Drug Book) obtainable at all apothecaries, can be used. Diluted cresole water is made by stirring 1 part (weight) of solution of cresole soap into 19 parts (weight) of water (about 4 table-spoonfuls of cresole soap solution to one litre of water).

Excrements, vomit, urine, etc. can be disinfected by means of diluted cresole water being mixed with them in equal parts. The mixture must stand at least an hour before being poured away.

2a. Fluid slaked Lime: To prepare this, one part (volume) of broken up burnt lime (Calcaria usta, caustic lime) must be mixed with four parts (volume) of water in the following way: the lime must be placed in a suitable vessel and first of all slaked by sprinkling it with $^3/_4$ parts (weight) of water whilst constantly stirring it. After the lime has absorbed the chalk and become pulverised, it must be mixed with the rest of the water to fluid slaked lime. If not for immediate use it should be kept in an airtight vessel and shaken up before being used.

Excrements, vomit, urine, etc. must be thoroughly mixed with equal parts of fluid slaked lime in order to be disinfected; the mixture must stand for an hour at the least before being poured away.

2b. Chloride of Lime. The disinfecting action of chloride of lime is only effectual when freshly prepared and kept in airtight vessels. Efficient chloride of lime is recognised by its penetrating smell of chlor.

In order to disinfect fluid refuse with chloride of lime two heaped up table spoonfuls must be added in the form of powder to each $^1/_2$ litre of slops and well mixed by stirring with a wooden stick. Fluid matter treated in this way can be poured away after 20 minutes. In order to disinfect a full bath four heaped up table spoonfuls of chloride of lime must be stirred up in the water with a wooden stick.

Bath water treated like this can be poured away after half an hour.

Appendix 2.

Memorandum on Typhoid fever.

Compiled at the Imperial Board of Health (Kaiserliches Gesundheitsamt).[1])

1. Character of the disease. Typhoid fever, called also intestinal or abdominal typhus, nervous or mucous fever, is an infectious disease, caused by the typhus bacillus, a certain class of bacteria. Numerous attacks of disease designated as gastric fever are also genuine cases of typhoid fever.

2. Course of the disease. The disease develops slowly with headache, want of appetite and fatigue. Fever chills and heat make their appearance

[1]) With the Cooperation of the following members of the Imperial Council of Hygiene, („Reichs-Gesundheitsrat"): Dr. Kirchner and Dr. Robert Koch, both of Berlin, and Dr. Krieger of Strassburg.

and soon after these symptoms patients generally have to take to their beds. There appears diarrhoea of a light yellow colour; the fever increases from day to day, until at the end of the first week it attains a temperature of 40° C. (104 F,) and higher. The patient suffers greatly from thirst, the tongue is coated, and his lips are parched and sleep is restless.

During the second week, during which the fever retains the same temperature a considerable loss of strength is generally apparent. Symptoms of disorder in the nervous system, such as stupor or delirium, make their appearance. At this period bright red spots (roseola), similar to fleabites, appear on parts of the chest, the abdomen and frequently on the thighs; pressure with the finger causes them to disappear, only to return as soon as the pressure ceases. Symptoms of trouble of the respiratory organs (catarrh) are seldom missing; inflammation of the lungs sometimes makes its appearance.

During the third week the fever begins to decrease slowly and gradually; if the disease takes a favourable course, it can generally be considered at an end with the fourth week. Reconvalescents however often require months before complete recovery. If the course of the disease of unfavourable, the fever remains at a high temperature for a longer period; the prostration and restlessness increase and death occurs in the fourth or fifth week. Serious aggravations of the disease may cause death at an earlier period. The mortality, which may be lowered by a suitable treatment and care, varies from 5 to 15 in 100 cases.

Besides the cases accompanied by serious symptoms, there appear, as in other infections diseases,

some cases of light symptoms and slight discomfort; this is the case especially with children.

3. Treatment of the disease. One must not neglect to call in a physician as early as possible. The disease being accompanied with ulceration in the intestines, only the diet prescribed by the physician is allowed during the course of the disease and reconvalescence. Errors in this direction can dangerously increase the tendency to intestinal haemorrhage and cause the death of the patient, trough rupture of the intestines at the ulcerated places. There is especial danger in this respect during reconvalescence on account of the strong feeling of hunger which the patient has. It is necessary that the patient lies comfortably, in order to prevent bed-sores. As long as fever prevails, care must be taken to cleanse the mouth properly and quench the thirst according to the directions of the physician. The recovery in many serious cases is due to careful nursing.

4. Modes of infection of the disease. The germs of infection are chiefly excreted by the typhoid patient in the evacuations of the bowels and in the urine, sometimes in the sputum, excretions of the nose and in the saliva (from coughing, sneezing, vomiting).

Even traces of excretions coming from typhoid patients can transmit the disease. If these germs find their way on to body or bed linen, to clothes, the floor, table-ware, to milk, vegetables, fruit or salads, they can easily enter the system of other persons.

The disease can also be carried by water used for cleansing eating and drinking utensils, which are tainted with germs of typhoid fever. Flies can also transmit the disease. Transmission of the disease

by tainted articles used by patients is the more liable, as evacuations often take place, while the patients are in an unconscious condition.

If the typhoid germ is transmitted to persons in close connection with the patient, only isolated cases occur (so-called infection by contact).

If however the germs are transmitted to articles in general use, for instance water, milk etc. epidemics can arise; hundreds and sometimes even thousands of cases occurring simultaneously as if by an explosive force.

5. Isolation of patients. It is vere difficult to nurse a person afflicted with typhoid fever at home, on account of the enormous danger of infection. For this reason alone, it is advisable to have patients transported as soon as possible to a hospital. This is especially to be recommended, where the infection of a large number of people is to be feared, as for instance in hotels, inns, boarding- and public schools, asylums, prisons and such institutions schools, milk shops, vegetable shops and other provision shops.

If exceptional cases occur, where transport to a hospital is impossible, the patient should be brought to a room far removed from the remaining dwelling. All unnecessary communication with the patient must be avoided. No one should visit a person afflicted with typhoid fever, unless duty compel him. Children especially should never be permitted to communicate with typhoid patients, as experience shows, that they can easily bocome infected and carry the disease to others. Children belonging to families, where typhoid fever exists, should therefore remain away from school.

After coming in contact with a person afflicted with typhoid fever, the hands of the visitor should

be thoroughly cleansed with a desinfectant. (See below Addenda.)

In order to prevent infection, it is necessary that the sick-room be very plainly furnished and the floor washed at least once every day. Carpets and curtains should be removed.

In rooms occupied by persons afflicted with typhoid fever, eating and drinking should never be allowed and smoking should be prohibited in the interest of the patient as well, as for the interest of the smoker.

6. Conduct of the nurses. Those persons entrusted with the care and attendance of typhoid patients, should wear easily washable garments or aprons covering the entire front of the body; they should preserve the greatest cleanliness. After coming in contact with the patient or with his body-linen or removing his evacuations, the hands must be thoroughly cleansed with soap, brush and hot water and disinfected with diluted water of Cresol (see Addenda No. 1). Particularly great caution must be taken in bathing the patient. The water should be splashed as little as possible. Nurses are especially warned not to touch food before cleansing and disinfecting their hands or to put any article in to the mouth, which may haye been infected by a patient, as for instance eating or drinking utensils, etc.

7. Removal of evacuations. Persons afflicted with typhoid fever should never use closets. All excretions (from bowels, bladder or stomach) should be retained in easily cleansed vessels and never thrown into closets or manure heaps before being disinfected. They should be rendered innocuous by means of lime milk (see addenda No. 2a), chloride of lime (see addenda No. 2b) or diluted water of

Cresol (see addenda No. 1) before being removed. In cases of emergency, if no disinfectants are on hand, the excrements can be buried in places far removed from drains, pumps and buildings, where infection is not to be feared. Especial care must be taken not to carelessly throw excrements away or soil the floor, clothes, etc., not even with traces of the excrements.

Especial attention must be given to the sputum of patients in order to render it innocuous. Handkerchiefs and clothes which were used must be placed for at least one hour in diluted water of Cresol or boiled in water, before being sent to the laundry.

For catching the sputum, wiping the mouth and nose, it is best to use gauze cotton rags, which must be disinfected after use or burned.

The evacuations and urine of typhoid patients should never be thrown near pumps or drains, where water for drinking and other purposes is taken; the vessels after being emptied should never be cleansed at such places where water is supplied or taken from. Water used for washing and bathing typhoid patients can also cause infection. It must therefore be rendered innocuous and must not be poured away near drains and pumps. If possible it should be made innocuous by an addition of chloride of lime before removal in order to prevent all infection.

Attention must be paid to the fact that the evacuations of persons who were afflicted with typhoid fever and who are already reconvalescent, yet contain infections germs for a long period. Such persons must be treated as if they were still ill, as far as disinfection is concerned, until the physician declares that infection is no longer to be feared.

8. Treatment of body and bed linen, clothes and other articles of use. All washable clothing,

such as body and bed linen and washable parts of clothing should remain at least one hour in diluted water of Cresol (see addenda No. 1) or boiled in water, before being sent to the laundry. Clothing used by typhoid patients, which cannod be washed, should be disinfected with steam in a disinfecting establishment if possible. If this is not possible they should be well brushed with diluted water of Cresol. All eating utensils (plates, cups, glasses, spoons, forks, knives, etc.) used by typhoid patients should be thoroughly cleansed with hot soda solution before being used by other persons.

9. Disinfection of the dwelling. Soiled places on the floor of the sick-room should be covered with a diluted water of Cresol (see addenda No. 1) and washed after one hour.

After the transport of a patient to the hospital or to a more suitable room, after complete recovery or after death the sick-room and all rooms used by the patient together with their contents are to be thoroughly disinfected according to the directions of a physician.

Especial care should be taken in hotels, inns, boarding schools, asylums, prisons and such institutions also on ships.

10. Trade in provisions. Tbe preparation, storage and sale of provisions in or near rooms occupied by typhoid patients should not be allowed under any circumstances.

During an epedimic, no water, milk, fruit or vegetables should be used as food in a raw condition.

11. Transport of typhoid patients. If possible typhoid patients should be transported in ambulances. No public conveyances (cabs, street cars etc.) should as a rule be used for such transport.

If this occurs in cases of emergency, thorough cleansing and disinfection should be directly required.

Corpses of persons who have died from typhoid fever are infectious. They should therefore be transferred to a deadhouse as soon as possible, if such a one does not exist, to an isolated, locked room. The exposure of the body in an open coffin, offering food in the rooms where the person died etc. are dangerous and not to be permitted.

ADDENDA.

The following disinfectants are recommended:

1. Diluted water of Cresol. This is prepared from Crude Cresol and Soft Soap 1 part of each (liquor cresoli saponatus in the German pharmacopoea) obtainable in every apothecary shop. The solution is made by mixing 1 part in weight of Crude Cresol and Soft Soap with 19 parts water and whell shaken, (i. e. about 4 tablespoonsful of Crude Cresol and Soft Soap to a litre of water).

All evacuations of the bowels, urine, and excrement from vomiting should be disinfected by mixing with equal parts of diluted water of Cresol. This mixture must remain at least one hour before being thrown away.

2a. Lime milk. This is prepared by mixing one part of freshly burned lime (calcaria usta, quick lime) with four parts of water in the following manner: Place the lime in a suitable receptacle and sprinkle it with $^3/_4$ as much water, stirring constantly. After the lime has absorbed the water and become thereby transformed into a powder, the rest of the water is added and stirred to lime milk. If the milk is not used directly, it must be placed in closed receptacles and shaken before being used.

Evacuations, urine and other excrements are disinfected by mixed them with an equal quantity of lime milk. This mixture should remain an hour before being thrown away.

2b. Chloride of lime. Chloride of lime has sufficient disinfecting properties only if it is freshly prepared and kept in tight jars. A strong chlor-like odour gives evidence that the quality is good.

For disinfecting watery excrements, two heaping tablespoonsful of pulverized chloride of lime is added to every $^1/_2$ litre of excrement and stirred well with a wooden stick. After remaining 20 minutes the mixture can be removed. For disinfecting a full bath, four heaping tablespoonsful of pulverized chloride of lime are added and stirred well with a wooden stick. After remaining $^1/_2$ hour, the water so treated can be thrown away.

Appendix 3.

FORM USED

for a case or a suspected case of Typhoid fever.

Place of illness: .....

Dwelling (Street, Number of House, Floor): .....

Concerning the Sick Person.

Family name: .....

Sex: male, female (underline the one correct) .....

Age: .....

Calling or Trade: .....

Place of Employment: .....

Whether a stranger, and if so, from where and when: .....

Day of illness: .....

Day of death: .....

Remarks (especially whether connected with a preceding case of Typhoid fever and if so which one): .....

Appendix 4.

LIST OF TYPHOID CASES.

1.	2.	3.	4.		5.	6.	7.	8.	9.	10.
Place of illness	Dwelling (Street number of house, floor	Family-name	Sex of the sick person		Trade or calling	Age	Place of employment	Day of illness	Day of death	Remarks, (especially whether a stranger and if so, from where, and when)
			male	female						

Appendix 5.

Directions for disinfecting in case of Typhoid fever.

I. Disinfecting means (Disinfectants).

a) Cresole — Carbolic acid.

1. Diluted cresole water. In order to prepare this, 1 part (weight) of cresole soap solution (Liquor cresoli saponatus of the Drug book of the Imperial German Empire, 4th edition) should be mixed with 19 parts (weight) of water. 100 parts (weight) contain about $2^1/_2$ parts of crude cresole. 100 parts of cresole water (Aqua cresolica of the Drug book of the Imperial German Empire, 4th edition) contain 5 parts of crude cresole, and should be diluted with an equal amount of water before use.

2. Carbolic acid solution. 1 part (weight) of liquid carbolic acid (Acidum carbolicum liquefactum) should be mixed with 30 parts (weight) of water.

b) Chloride of lime.

Chloride of lime (Calcaria chlorata of the Drug book of the German Empire 4th edition) only produces an adequate disinfecting action, when it is freshly prepared and kept in air tight vessels; it schould smell strongly of Chlor and be used in a mixture of 1 : 50 parts (weight) of water.

c) Lime.

Fluid slaked lime. In order to prepare this, 1 part (volume) of burnt lime, in small pieces, so called fat lime, Calcaria usta should be mixed with 4 parts (volume) of water as follows: The lime is put into a suitable vessel, stirred continually being mixed with $^3/_4$ parts (volume) and thus slaked.

After the lime has absorbed the water and fallen to powder, it is stirred up with the rest of the water to fluid slaked lime. The slaked lime should be kept in a well-closed vessel, when it is not used soon, and should be stirred up, before being used.

d) Potash Soap

3 parts (weight) of potash soap (so called soft soap, green, or black soap) should be dissolved in 100 parts (weight) of boiling hot water. (For instance $^1/_2$ kilogram of soap in 17 litres of water.)

This solution should be used hot.

e) Formaldehyd.

Formaldehyd is a strong smelling gas, which irritates the mucous membranes, the aerial duct, the nose and eyes, and which can be developed from formaline, a 35 % water solution of formaldehyd to be obtained at druggists shops (Formaldehydum solutum of the Drug book), by boiling or diffusing it with steam, or by heating it. This formaldehyd

solution formaline must be kept in air tight vessels, and well protected from the light.

Formaldehyd in the shape of gas can be used for disinfecting closed rooms or spaces, that can be well closed on all sides, and is adapted for the destruction of the germs of illnesses, which lie on open surfaces, or not very deep in the same. In order to produce the disinfecting effect, the following conditions are necessary:

the space to be disinfected must be made thoroughly air tight, by gumming over and cementing all crevices and open parts of the windows, doors, ventilators etc.,

at least 5 grammes of formaldehyd to every 1 cbm. of atmosphere, must be developed,

the simultaneous development of steam until the air of the space to be disinfected is thoroughly saturated (3 litres of water for every 100 cubic metres of space),

and seven hours at least of uninterrupted closure of the space filled with steam and formaldehyd; this time can be shortened by half, if double the amount of formaldehyd is used.

Formaldehyd can be conducted from outside in conjunction with steam, through keyholes, or small openings bored in the doors, etc., into the space to be disinfected.

Disinfection with formaldehyd should only be carried out according to methods, that have been tested and by trained disinfectors, whom should be given exact instructions in each single case. After the disinfection is concluded, it is advisable to introduce ammoniac gas, in order to remove the smell of the formaldehyd, pervading the space.

f) Steam apparatuses.

Only such apparatuses and arrangements can be considered suitable, which have been tested by experts.

Under certain circumstances emergency apparatuses may suffice. —

The examination of such apparatuses and arrangements must extend to the disposition of the steam inlet and outlet pipes, to the manipulation of the same, and the necessary duration of the action of the steam for a thorough disinfection.

The handling of the apparatus, etc., should, if possible, be entrusted to well trained disinfectors.

g) Boiling-heat.

Boiling in water, salt water, or lye, disinfects articles. The liquid must quite cover the articles, which should be kept at least ten minutes in it, whilst being boiled.

The choice of disinfectants mentioned must be made according to the conditions prevailing. The official doctors may be allowed under certain circumstances to use other means which have been tested for their efficiency as disinfectants; the proportions of the mixture or solution however must be adjusted and the disinfectant used in such a manner, that the results of the disinfection are as effective, as if mediums mentioned under a to g. had been used.

II. Employment of Disinfectants in detail.

1. All excretions of the sick person festering secretions, urine, vomit, or faecal matter must be disinfected with diluted cresole water described in Ia, or by boiling heat (Ig). It is advisable to immediately collect such excretions in vessels which contain at

least the same amount of disinfecting fluid, and to stir the whole up thoroughly.

The mixtures should stand for one hour at the least, and can only then be disposed of.

Water-closets should be disinfected in such a manner; the seats should be cleansed thoroughly with diluted cresol water or with fluid slaked lime, and a large quantity of fluid slaket lime should be poured into the openings of the seats. The contents of the cesspools should be thoroughly poured over with fluid slaked lime, and should not be emptied (if possible) as long as the epidemic lasts. The contents of tuns, or other vessels, which are used in water-closets for the purpose of keeping the faecal matter at the bottom of the W. C. should be stirred with fluid slaked lime of about the same quantity as the excrements; and the latter should be removed only after having been for 24 hours mixed with the disinfectant. The tuns and similar vessels should be thoroughly cleansed and rinsed on the outside and inside with fluid slaked lime after the removal of the faecal matter.

Dirt tuns should be disinfected with chloride of lime or with slaked lime; in such a manner; there should be added as much of the chloride of lime, until the liquid smells strongly like chlorine; and of the slaked lime such a quantity sufficient to colour red litmus paper strongly and durably blue. In any case the liquid may not be poured away before a full hour slapsed. For the disinfection of a full bath (in a bathing tub) four well-filled dinner-table spoons of cloride of lime in form of a powder should be added to the water among stirring with a woodenstick. The bathing water after having been treated in this way-should not be poured away before half-an hour.

2. Hands or other parts of the body must be disinfected by thoroughly washing them in diluted cresole water, or a solution of carbolic acid (Ia), every time after having been in contact with infected articles (excretions of the patient, dirty linen, etc).

3. Bedding and the linen of patients, as well as articles of clothing, etc. must be either boiled (Ig), or put into a vessel filled with diluted cresole water, or a solution of carbolic acid. The liquid should completely cover the articles put into the vessels, and must remain in it for one hour at the least. They should then be rinsed in water and cleaned. The water remaining need not be regarded as infected.

4. Articles of clothing which cannot be washed, matresses, carpets and everything suitable for disinfection by steam, must be disinfected in steam apparatuses (If).

5. All the articles to be disinfected must be wrapped in cloths, which have been moistened in a solution of carbolic acid (Ia), and if possible put into tightly closing vessels, when being packed for conveyance to the disinfecting works or apparatus.

Whoever touches such washing, etc., before the articles have been disinfected, must also disinfect his hands according to directions given in No. 2.

6. In order to disinfect infected or suspicious spaces, especially those in which the persons sick of typhoid fever have been, the resting places, utensils and similar articles, the walls, floors, and under certain conditions the ceilings must, first of all, be thoroughly washed with rags saturated in diluted cresole water or carbolic acid solution (Ia); (special care should be taken, that the solutions penetrate into all cracks, fissures and crevices.

Special attention shold also paid to the resting places and all utensils, wall and floor surfaces situated within a distance of two feet of the deceased, or sick persons, when disinfecting).

The different spaces and utensils must then be rinsed with plenty of water, or with a solution of potash soap. After the disinfection has been carried out, everything should be thoroughly aired.

7. The use of formaldehyd is especially adopted for the so called disinfection of surfaces.

After the preliminary disinfection by means of formaldehyd, only the walls, ceiling, free open surfaces, and utensils can be regarded as having been disinfected. Everything else, especially all those parts or things which have cracks or crevices, should be disinfected according to the above mentioned regulations.

8. Eating and drinking vessels, used by patients should be either boiled out, (Ig) or be kept standing with a hot solution of kali-soap (so-called green or black soap) [IIa] for half an hour in them, and afterwards be thoroughly rinsed. Washing basins, Spittoons, in italies pots de chambre and such-like utensils should be thoroughly rinsed with diluted cresole-water after their contents having been disinfected.

Articles of leather, wood and metal parts of furniture as well as other similar objects, must be carefully and repeatedly rubbed over with rags that have been moistened in diluted cresole water, or a solution of carbolic acid (Ia). The rags used must be burnt.

Furs should be soaked on the hair side right up to the roots with diluted cresole water, or with a solution of carbolic acid (Ia). After they have been

exposed to this action for twelve hours, the furs may be washed out and further cleaned.

Plush and similar upholstery must be disinfected according to No. 3 und 4, or soaked either with diluted cresole water or a solution of carbolic acid, (Ia), brushed out when damp, aired for a series of days and exposed to the sunlight.

9. Articles of little value (contents of straw sacks, used rags, etc) must be burnt.

10. The floor or earth soiled by the excrements of sick persons, pavement, gutters, open manure heaps must be disinfected by pouring diluted cresole water (Ia) or fluid slaked lime (I c. 1) over them.

11. If the disinfection is to be extended to persons, care must be taken that they first wash the whole of their body with soap, and then take a complete bath. Clothes and other personal articles must be treated according to No. 3 and 4.

12. The corpses of persons who have died from typhoid fever, must be wrapped in cloths, which have been saturated in the disinfecting fluids mentioned in Ia, and then placed in airtight coffins, the bottoms of which are covered with a plentiful layer of sawdust, peat refuse, or other absorbent stuffs.

13. Deviations from the regulations of No. 1 to 14 are allowed, when in the opinion of the official doctor disinfection has already been actually secured.

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